to the surface in a tract between Devizes, Calne, and Wallingford. This deposit consists of permeable light-coloured sands and of fissile calcareous sandstones, and is of very uniform lithological character. It reposes upon a mass of clay, called the gault, which is from 120 to 180 feet thick, and perfectly impermeable. Below the gault is the lower greensand, which consists of a very variable series of beds, chiefly of light-coloured siliceous sands. At Folkstone it is 406 feet thick; at Dorking probably not less than 600 feet, and at Devizes only 20 feet. In Bedfordshire it may be from 300 to 400 feet thick, thinning off on the one side towards Oxfordshire, and in the other into Cambridgeshire.

The area occupied by the exposed effective surface of the upper greensand is stated to be probably about 110 square miles; lower greensand, about 390 square miles. The extent of their subterranean area is then given, and from these data and their relative thickness, the author estimates the following as the respective dimensions, in round numbers, of the different water-bearing deposits.

Lower tertiary strata.....	10,500
Upper greensand	150,000
Lower greensand	500,000

The water in the lower greensand is held up by the thick and retentive clays known as the weald and kimmeridge clays.

Mr. Prestwich concludes that it is probable, both with regard to area for drainage, to lithological character facilitating the transmission of water, and to magnitude of volume as a reservoir for water, that the upper and the lower greensands present conditions far more favourable than the lower tertiaries, as their areas of exposed surface are greater—their lithological character and thickness superior—the position of outcrop usually better—their surfaces more generally free from drift, and they are both, the lower greensand especially, very absorbent.

He then seeks to determine to what extent these favourable conditions may be rendered inoperative by any disturbances in the strata between their outcrop and a central point at London, and although he admits the existence of several important faults in the lower greensand, and allows for them in calculating the water value of the strata, still he is of opinion that there are no disturbances of sufficient power to interrupt the underground flow of water to London, and he therefore sees no reason why, in the case of the upper greensand, the downs and valleys of Wiltshire, and the plains of Oxfordshire and Berkshire, should not contribute their contingent to a supply of water at London, or why even a much larger supply, amounting possibly to as much as fifty millions of gallons daily, if needed, should not be furnished by the lower greensand of the hills of Kent, Surrey, Bedfordshire, and Buckinghamshire.

Upon geological grounds he considers it probable that the chalk is not more than 600 to 700 feet thick beneath London, and he therefore thinks that the upper greensand might be reached at a depth not exceeding 1,000 feet, and the lower greensand at 1,200 feet, and as, in the district under consideration, the outcrop of the former is at an elevation of from 130 to 450 feet above Trinity high water level, and that of the latter of from 100 to 300 feet, the water from these sources might rise to a height of from 80 to 100 feet (if not more) above the low levels of the metropolis.

At the Artesian well of Grenelle, in Paris, the water rises about 120 feet above the surface of the ground. The lower cretaceous strata into which it is bored crop out beyond Troyes at an elevation of about 300 to 350 feet above the level of the well. The depth of it is nearly 1,800 feet, and the yield of water about one million of gallons daily.

The author briefly alluded to the Artesian well at Calais, as a term of comparison on the question of the difficulty and expense of such an undertaking. The thickness of the tertiary strata and of the chalk beneath Calais he considered to be rather more than beneath London, the former being (with the gravel) 241 feet, and the latter 762 feet. This well was bored to a depth of 1,047 feet, at a cost, including merely the temporary tubes, of 97,000 francs (with a further charge of 10,000 francs to the engineer, if it had been successful*), and the depth was afterwards increased to 1,150 feet for a further sum of 12,000 francs.

The author conceives, therefore, that there would be no practical difficulty in penetrating, by means of Artesian wells, both to the upper and to the lower greensands beneath London. The quality of the water from the former would probably be rather purer and less hard than that from the chalk: from the latter it would be more uncertain, although the sands are chiefly silicious. (At Grenelle, however, the solid residue from 100 litres of the well water was 14 grammes, whilst from the same quantity of Seine water it was 17½ grammes.) Still, such water would be perfectly free from organic impurities, and would possess a uniform temperature of from about 68 deg. to 70 deg. Mr. Prestwich believes that from this source a large and important auxiliary supply might at all events be easily and economically obtained, applicable to all ordinary purposes where large quantities were required, such as for cleansing the streets or courts, for stand pipes, for safety against fires, for public fountains and ornamental waters, for irrigation, and possibly for baths, and which would thus contribute to the sanitary improvement, as well as to the ornament and convenience of the metropolis.

Mr. Tite, in rising to propose a vote of thanks to Mr. Prestwich, said that he should take that opportunity of saying a few words on the general question of the supply of water to the metropolis. He reminded the meeting, that on the occasion of the reading of the paper by Dr. Buckland, on the same subject, early in the session, when they had the honour of the company of many gentlemen connected with the Legislature and of influence in the country, that he (Mr. Tite) ventured to suggest that it was extremely desirable that this very important question should not be left in the hands of the many private companies that had been started, but that a Government commission should be issued to inquire into it and all its details, to examine the various projects, and to choose the best. That unless this were done the country would have to lament a repetition of the competition and the extravagance which led to so much evil in the railway system. This hint he was glad to perceive had been partly adopted, for the Government had stopped all the new projects in the House of Commons, and had handed over the subject to the Board of Health, who had reported upon it, and published the results of their inquiries, accompanied also by their own recommendations on an entirely new mode of water supply.

He thought, however, that the report would have been more satisfactory if it had been accompanied by the full evidence of the several persons examined; and further that the parties most interested ought to have had some opportunity of stating their case, and of being present at their examinations. It appeared, however, to be admitted that the supply of water to the metropolis from the nine companies now existing had been enormously large—the supply amounting to no less than forty-four millions of gallons per diem. That this branch of the enquiry had been intrusted to an architect, Mr. Cresy (now one of the engineering inspectors), and that he had reported that this statement was, in the main, true. The best illustration of this enormous supply was given in the words of the report, that "the daily quantity was equal to a lake thirty inches deep, covering the whole area of Hyde-park." The total annual quantity might, therefore, be taken at 16,000 millions of gallons. It appeared further from the report, that in the main, the water of this enormous supply was delivered in a state of considerable purity—except in the case of the Lambeth Company, and that company had obtained powers to procure a better supply, but that the principal objection arose, as it was alleged, from the extreme hardness of the water, owing to the salts of lime held in solution. Mr. Tite explained that this question of hardness was suggested as containing the elements of insalubrity and great wastefulness when applied to domestic purposes. That it appeared to him, however, that the Board of Health failed, to a great extent, in their objections, because the only direct evidence of the first opinion was that of Dr. Sutherland, of Liverpool, where it was well known the hardness of the water was much owing to salts of magnesia and sulphates of lime, whereas the hardness of all London water was mainly due to the bi-carbonate of lime. That if this was insalubrious, it might have been easily determined by the evidence of the physicians of London, and that as to hardness derived from the latter cause, it was well known that in boiling, even for a few minutes, the bi-carbonate parted with its carbonic acid to a large extent, and that much of the carbonate of lime that remained was deposited in a solid shape or coating on the vessels, and which everybody knew from its constant appearance in our tea-kettles. Mr. Tite then explained that he thought that undue weight had been given to this objection, which, however, led this Board to seek for a supply from the rain waters gathered from the surface of the country, and which system had been adopted in the great towns of the north, such as Bolton and Sheffield, and was now attempted on the very largest scale at Manchester. It appeared to him, however, that these towns possessed advantages which London could not claim, because they had their collecting grounds in mountain ranges, where much more rain fell than near London, and where the gorges of the hills afforded ready means of providing reservoirs, and the nature of the suface also, such as the millstone grits and trap rocks, was a great advantage, because they were non-absorbent to a very great extent. That a similar process has been adopted at Edinburgh by the late Sir John Rennie, who had dammed up some large valleys in the Pentland hills, but that, notwithstanding, in a hot summer, the supply of water at Edinburgh was insufficient in quantity and defective in quality.

The scheme of the Board, it appeared, was to appropriate the rain-fall on 150 square miles of surface on the Bagshot Sands, though it was admitted that these waters were polluted by water from the peat, which, however, one of the witnesses, at page 105 of the Report, thought would not be objectionable, because of the antiseptic nature of such water, "though it was disagreeable in colour and taste." The Board had suggested the removal of the peat, and that legislative enactments should prevent the occupiers of the lands from manuring also in such a way as should lead to the pollution of the waters. Mr. Tite doubted the practicability of either of these suggestions. He showed, also, that the rain-fall at Greenwich in the year 1840, was only 16½ inches, and in 1847, 17½ inches, though in 1848 it was as much as 33 inches. That, of course, the supply must be calculated for a year of drought, but that this could only be done by the creation of enormous reservoirs. That, in point of fact, the reservoirs of Manchester were calculated for a six months' consumption, and would occupy an area of 408 acres with an average depth of 33 feet 5 inches, and that for London it would require at least 800 acres, with a depth of 40 feet. That the soil and site of Bagshot Heath was not adapted for such reservoirs, which could only be erected at an enormous expense; and that as the Board of Health desired further that the reservoirs should be covered, the whole scheme appeared an impossibility. Their report further stated that the evaporation amounted annually to from 15 to 20 inches, and that as it was impossible to speak on the average of more than a rainfall of 24 inches, the supply must be inadequate.* The total quantity of water falling on 150 square miles of ground, at 25 inches for the average fall, would amount to 54,300 millions of gallons, and if only 4 inches of this could be depended upon, or one-sixth of the whole quantity, the total supply would not be one-half of the quantity now supplied, and in seasons of drought very much less. In the report it was stated that by improved methods three-fifths might be collected, but Mr. Tite expressed his wish to show that in an analogous attempt made in France on a very large scale, and under circumstances nearly similar, only one-fiftieth part reached the reservoirs. The case in France was the attempt made to supply the water of Versailles from gathering ground on a tract of land under geological circumstances analogous to the Bagshot land. The detailed information on this subject had been obligingly furnished him by Mr. Geo. Burnell, and was as follows:—

Bruyère states, in his "Etudes relatives à l'Art des Constructions" (Paris, 1823), that the commission named to inquire into the water-supply of Versailles, in 1810, consisted of De Prony, Heurtier, Rondelet, Girard, Nory, with himself, Bruyère, as reporter or secretary.

He describes the works as a series of catch-water-drains, disposed so as to intercept the rainfall upon a surface of 15,000 hectares, or 37,500 acres English. The average fall is about 0·60 in depth, or 1 foot 8 inches. This would give an annual product of 75,000,000 metres cube, or above 200,000 metres cube per day. From the evaporation, infiltration, loss in the catch-water drains, &c., no more than 4,000 metres cube are really obtained.

These works were executed by a M. Gobert, under the orders of Colbert, between the years 1680 and 1702. The first portion executed was that by which the water falling upon the plains of Trappes, St. Gobert, and Clayes, above the valleys of the

* Geological reasons were suggested for its failure.

* Mr. Tite also quoted a year during which, in the very district in question, no rain of any importance had fallen for more than three months, viz. from May to the middle of August.

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